

# VIVEKANANDA PU COLLEGE

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## OBSTACLE AVOIDING ROBOT

ARBAZ ALI

2ND PUC

C SECTION

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## **OBSTACLE AVOIDING ROBOT**

Robotics is an interesting and fast growing field. Being a branch of engineering, the applications of robotics are increasing with the advancement of technology.

The concept of Mobile Robot is fast evolving and the number of mobile robots and their complexities are increasing with different applications.

There are many types of mobile robot navigation techniques like path planning, self – localization and map interpreting. An Obstacle Avoiding Robot is a type of autonomous mobile robot that avoids collision with unexpected obstacles.

In this project, an Obstacle Avoiding Robot is designed. It is an Arduino based robot that uses Ultrasonic range finder sensors to avoid collisions.

### **HARDWARE REQUIRED-**

**ARDUINO-UNO**

**MOTOR-SHIELD**

**SG9-SERVO MOTOR**

## **ULTRASONIC DISTANCE SENSOR**

**100nF Capacitors-(2 nos)**

**330 micro farad capacitor**

### **Component Description**

#### **ARDUINO UNO**

**Arduino Uno is an ATmega 328p Microcontroller based prototyping board. It is an open source electronic prototyping platform that can be used with various sensors and actuators. Arduino Uno has 14 digital I/O pins out of which 6 pins are used in this project.**

#### **HC – SR04**

**It is an Ultrasonic Range Finder Sensor. It is a non-contact based distance measurement system and can measure distance of 2cm to 4m**

#### **MOTOR SHIELD**

**It is a motor driver which can provide bi-directional drive current for two motors and the servo motors, It is can supply high current upto 600 mA for the Motors.**

## **Design of Obstacle Avoiding Robot using Arduino**

**Arduino is the main processing unit of the robot. Out of the 14 available digital I/O pins, 6 pins are used in this project design.**

**The Motors require a lot of current ,so the motor shield is used to run the Motors smoothly .We connect the supersonic sensor to the motor shield,One wire to 5V,one to Ground,one to +VCC, one to analogue pin 5, One to analogue pin 4.**

**we attach the Motor shield to the Arduino . We then connect the Supersonic sensor to the shield, VCC goes to +5v, Gnd goes to Gnd, Echo goes to analogue pin 5, Trig goes to analogue pin 4.**

**We then connect the Motors to the shield left motor goes to M2 socket , Right Motor goes to M3 socket, then we connect the servo motor to the shield, to avoid over rotating I added a 330micro farad capacitor.**

**Then the Arduino is connected to the computer and 3 libraries are loaded , one for Motor Shield, One for Arduino Uno, One for Super sonic sensor.**

## **WORKING**

**Before going to working of the project, it is important to understand how the ultrasonic sensor works. The basic principle behind the working of ultrasonic sensor is as follows:**

**Using an external trigger signal, the Trig pin on ultrasonic sensor is made logic high for at least  $10\mu\text{s}$ . A sonic burst from the transmitter module is sent. This consists of 8 pulses of 40KHz.**

**The signals return back after hitting a surface and the receiver detects this signal. The Echo pin is high from the time of sending the signal and receiving it. This time can be converted to distance using appropriate calculations.**

**The aim of this project is to implement an obstacle avoiding robot using ultrasonic sensor and Arduino. All the connections are made as per the circuit diagram. The working of the project is explained below.**

**When the robot is powered on, both the motors of the robot will run normally and the robot moves forward. During this time, the ultrasonic sensor continuously calculate the distance between the robot and the reflective surface.**

**This information is processed by the Arduino. If the distance between the robot and the obstacle is less than 15cm, the left wheel motor is reversed in direction and the right wheel motor is operated normally.**

**This will rotate the robot towards right. This rotation continues until the distance between the robot and any obstacle is greater than 15cm. The process continues forever and the robot keeps on moving without hitting any obstacle.**

## **APPLICATIONS**

**Obstacle avoiding robots can be used in almost all mobile robot navigation systems.**

**They can be used for household work like automatic vacuum cleaning.**

**They can also be used in dangerous environments, where human penetration could be fatal.**